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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/085,298	05/27/98	GOLDBERG	R TI-25588

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EXAMINER

EATON, K

ART UNIT

PAPER NUMBER

2823

DATE MAILED: 04/26/00

Please find below and/or attached an Office communication concerning this application or
proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

09/085,298

Applicant(s)

GOLDBERG, RICHARD TODD

Examiner

Kurt M Eaton

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Status

- 1) ☒ Responsive to communication(s) filed on 22 February 2000.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- a) ☐ All b) ☐ Some * c) ☐ None of the CERTIFIED copies of the priority documents have been:
1. ☐ received.
 2. ☐ received in Application No. (Series Code / Serial Number) _____.
 3. ☐ received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. & 119(e).

Attachment(s)

- 14) ☒ Notice of References Cited (PTO-892) 17) ☐ Interview Summary (PTO-413) Paper No(s) _____.
- 15) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 18) ☐ Notice of Informal Patent Application (PTO-152)
- 16) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 19) ☐ Other: _____.

Art Unit: 2823

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 13 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

3. Claim 13 recites the limitation "heating said silicon-containing structure to an elevated temperature which is greater than 900 °C" in lines 4-5 of claim 13. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-4, and 6 are rejected under 35 U.S.C. 102(b) as being anticipated by Nozaki et al..

In re claim 1, Nozaki et al. (herein referred to as Nozaki) shows in Figures 2 and 11, a method of forming a dielectric layer on a silicon-containing structure, wherein the method includes the steps of: providing a nitrogen containing gas; heating the silicon-containing structure to an

Art Unit: 2823

elevated temperature which is greater than 700 °C; and striking a plasma above the silicon-containing structure, wherein a combination of the nitrogen-containing gas, the elevated temperature, and the plasma results in the thermal nitridation of a portion of the silicon-containing structure {column 4, line 16 – column 5, line 24; column 9, lines 28-40}.

In re claim 2, Nozaki shows wherein the elevated temperature is greater than 900 °C {column 5, lines 5-8}.

In re claim 3, Nozaki shows wherein the elevated temperature is greater than 1000 °C {column 5, lines 5-8}.

In re claim 4, Nozaki shows wherein the silicon-containing structure is a silicon substrate {column 4, lines 24-26}.

In re claim 6, Nozaki shows wherein the nitrogen containing gas is pure N₂ {column 11, lines 36-37}.

Claim Rejections - 35 USC § 103

6. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

7. Claims 5, 7, 9, 10, and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nozaki in view of Tseng, as previously applied in the office action mailed 11/17/99.

Nozaki substantially discloses the invention as claimed but fails to show wherein the silicon-containing structure is a bottom electrode of a storage capacitor of a memory device and the nitrided portion of the silicon-containing structure is a capacitor dielectric; and forming a top structure over the capacitor dielectric.

Art Unit: 2823

Tseng teaches that a silicon nitride dielectric layer may be formed over a bottom electrode of a storage capacitor of a memory device wherein the bottom electrode is made of silicon containing material {column 8, lines 15-19}.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to form the thermally nitrided silicon containing material of Nozaki such that it was a capacitor dielectric between a bottom electrode of a storage capacitor of a memory device and a top structure as in Tseng since, as evidenced by Tseng, silicon containing bottom structures formed as bottom electrodes for storage capacitors with dielectric layers formed of silicon nitride overlying then is well known in the art. Furthermore, the specification contains no disclosure of either the critical nature of the claimed structures or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen structure or upon another variable recited in a claim, the applicant must show that the particular limitations are critical.

8. Claims 8 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nozaki in view of Taft as previously applied in the office action mailed 11/17/99.

Nozaki substantially discloses the invention as claimed but fails to show wherein a top structure is formed over the thermally nitrided silicon containing structure.

Taft teaches that a silicon nitride dielectric layer may be formed over a silicon containing structure such as a silicon substrate and that a gate structure may be formed over the silicon nitride dielectric layer {column 2, line 26 – column 4, line 47}.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to form the thermally nitrided silicon containing material of Nozaki such that it was a gate dielectric layer between a silicon substrate and a gate structure as in Taft since, as evidenced by Taft,

Art Unit: 2823

gate structures overlying silicon substrates separated by silicon nitride dielectrics are well known within the art. Furthermore, the specification contains no disclosure of either the critical nature of the claimed structures or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen structure or upon another variable recited in a claim, the applicant must show that the particular limitations are critical.

9. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nozaki in view of Tseng as applied to claim 7 above, and further in view of Iyer, as previously applied in the office action mailed 11/17/99.

Tseng teaches that the dielectric layer between the bottom and top electrodes of the storage capacitor may be made of a silicon oxynitride material.

Nozaki in view of Tseng substantially discloses the invention as claimed but fails to show wherein the nitrogen containing gas includes a combination of N_2 and O_2 .

Iyer teaches that a dielectric layer may be formed over a silicon containing structure by reacting N_2 and O_2 gases in a plasma discharge {column 4, lines 48-61}.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to form the dielectric layer of Nozaki in view of Tseng using the nitrogen containing gas of Iyer since the two gases would have produced a dielectric layer over a silicon containing structure. Thus, the decision to form a dielectric layer using a pure nitrogen gas or a gas of nitrogen and oxygen, in the case as outlined above, would have required only routine skill in the art. Furthermore, the specification contains no disclosure of either the critical nature of the claimed N_2/O_2 gas combination or any unexpected results arising therefrom. Where patentability is said to

Art Unit: 2823

be based upon particular chosen gas mixtures or upon another variable recited in a claim, the applicant must show that the particular limitations are critical.

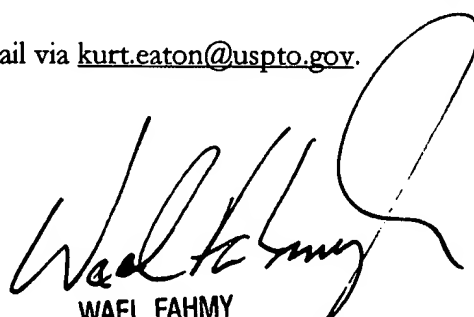
Response to Arguments

10. Applicant's arguments with respect to claims 1-13 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

11. Paper related to this application may be submitted directly to Art Unit 2823 by facsimile transmission. Papers should be faxed to Art Unit 2823 via the Art Unit 2823 Fax Center located in Crystal Plaza 4, room 4C23. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit 2823 Fax Center number is (703) 308-7722 or -7724. The Art Unit 2823 Fax Center is to be used only for papers related to Art Unit 2823 applications.

Any inquiry concerning this communication of earlier communication from the examiner should be directed to **Kurt Eaton** at (703) 305-0383 and between the hours of 8:00 AM to 4:00 PM (Eastern Standard Time) Monday through Friday or by e-mail via kurt.eaton@uspto.gov.


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